

## **REMARKS**

Applicants respectfully request reconsideration and allowance of the pending claims.

### **I. Status of the Claims**

Upon entry of this amendment, claims 1-38 remain pending. Claims 14-27 and 34-35 are marked as withdrawn.

Claims 1, 5, 12, 14, 29-33, and 36-38 have been amended. The amendments to claims 1, 12, and 14 are supported by paragraphs [0026] and [0027]. The remaining amendments have been made to clarify the claims.

### **II. Elections/Restrictions**

Applicants affirm the election of the group I claims 1-13, 28-33, and 36-38. Applicants have marked claims 14-27 and 34-35 as withdrawn.

Claim 14 has been amended to require all of the limitations of the film of claim 1. In view thereof, should claim 1 be subsequently found allowable, applicants respectfully request rejoinder of the process claims 14-27.

### **III. Double Patenting**

Applicants acknowledge the provisional rejection of claims 1-13, 28-33, and 36-38 on the ground of nonstatutory obviousness-type double patenting over claims 1-4 and 7-17 of co-pending application Ser. No. 11/130,972 (published as U.S. 2005/0287111). Unless and until the co-pending application matures into a patent or the double patenting rejection is the sole remaining rejection in the present case, the appropriateness of this rejection cannot be ascertained.

Applicants therefore request the double patenting rejection be held in abeyance until one of these two conditions is met.

**IV. Obviousness Over Co-pending Application Ser. No. 11/130,972**

In response to the rejection of claims 1-13, 28-33, and 36-38 over co-pending application Ser. No. 11/130,972 (published as U.S. 2005/0287111), pursuant to MPEP §706.02(1)(2), applicants hereby submit:

The present Application Ser. No. 10/594,185 and co-pending application Ser. No. 11/130,972 (published as U.S. 2005/0287111) were, at the time the invention of Application Ser. No. 10/594,185 was made, owned by Florida State University Research Foundation, Inc.

In view of the above statement, co-pending application Ser. No. 11/130,972 (published as U.S. 2005/0287111) is disqualified as prior art under 35 U.S.C. §103(c).

**V. Claim Objection**

In response to the objections to claim 29, claim 29 has been amended so that it conforms to proper claim format.

**VI. General Comments Regarding the Claim Rejections**

All of the claims have been rejected as either being anticipated or obvious. Claim 1 is directed to a polyelectrolyte film comprising an interpenetrating network of a net positively charged polyelectrolyte polymer comprising repeat units with at least two fluorine atoms and a net negatively charged polyelectrolyte polymer comprising repeat units with at least two fluorine atoms. None of the multiple references cited

in this Office Action disclose such a polyelectrolyte film. Applicant is unaware of any reference that discloses such a polyelectrolyte film. In view thereof, based on the prior art of record, the film defined by claim 1 is novel.

Claims 2-8 define characteristics of the polymers used to prepare the polyelectrolyte film of claim 1 and are novel as well. In particular, no prior art reference discloses any of the fluorinated repeat units defined by claims 5 and 6.

Claim 12 is directed to a film comprising a charged polyelectrolyte polymer comprising repeat units with at least two fluorine atoms and a fluorinated charged particle, wherein the charge of the polymer is opposite that of the charge of the particle. None of the multiple references cited in this Office Action discloses such a film. Applicant is unaware of any reference that discloses such a polyelectrolyte film. In view thereof, based on the prior art of record, the film defined by claim 12 is novel.

Claims 29-33 and 36-38 define various substrates upon which the polyelectrolyte film may be deposited. Since no prior art reference describes the polyelectrolyte film defined by claim 1, articles comprising a substrate having the polyelectrolyte film defined by claim 1 on a surface thereof are novel.

The recognition that the polyelectrolyte film of claim 1 and the film of claim 12 are novel and thus unknown prior to applicant's disclosure is important because, according to the decision handed down by the predecessor court to the Federal Circuit, the United States Court of Customs and Patent Appeals, in *In Re Spormann*, 363 F.2d 444, 150 USPQ 449 (CCPA 1966), "Obviousness cannot be predicated on what is unknown." In this regard, it is important to note that since the polyelectrolyte film of claim 1 is unknown as witnessed by the fact that it has

never been previously described in any reference and, to the applicant's knowledge never prepared before the inventors prepared such a film, it also follows that the properties of the film, the properties of the repeat units of claims 5 and 6, and its usefulness in the articles defined by claims 29-33 and 36-38 are necessarily unknown. Since the film itself, its properties, and its applications are unknown, *In Re Spormann* compels the conclusion that it also could not have been obvious to use the previously unknown films on the substrates claimed.

The view that both the films and the articles claimed are non-obvious is further bolstered by the fact that the various references cited by the Office are limited to disclosing the use of, for example, polytetrafluoroethylene or fluorinated small molecules (i.e., previously known materials) on previously known substrates. No reference discloses anything resembling the polyelectrolyte films of claim 1 on the claimed substrates, e.g., on magnetic disks, between two moving metal surfaces, or between an electrode and a light emitting medium. Accordingly, no one, prior to applicant, successfully prepared the film defined claim 1 and no one, prior to applicant, successfully found a use for the film defined by claim 1.

In short, applicants discovered and disclosed a new polyelectrolyte film that was unknown and possessed unknown properties and uses in view of the prior art of record. The polyelectrolyte film defined by claim 1 is therefore *prima facie* obvious only if the prior art would have provided the ordinarily skilled person with some reason to prepare such a film. Applicants submit that no reason to do so is provided, as further described below. Even if the prior art had provided some reason to prepare the polyelectrolyte film of claim 1, according to the holding of *In Re Spormann*, the properties and

uses of such a film would have been unknown, and "Obviousness cannot be predicated on what is unknown." Accordingly, even, for the sake of argument, if the prior art provided some reason to prepare the polyelectrolyte film of claim 1, its uses in the various claimed articles would not have been known, which compels the conclusion that claims 29-33 and 36-38, at least, are not obvious.

The present anticipation and obviousness rejections are hereby addressed more fully below.

## VII. Claim Rejections Under 35 U.S.C. §102(e)

Reconsideration is requested of the rejection of claims 1-5 as being anticipated by Stevenson et al. (U.S. 2004/0191504).

Claim 1 is directed to a polyelectrolyte film comprising an interpenetrating network of a net positively charged polyelectrolyte polymer comprising repeat units with at least two fluorine atoms and a net negatively charged polyelectrolyte polymer comprising repeat units with at least two fluorine atoms.

As stated in MPEP §2131,

### **TO ANTICIPATE A CLAIM, THE REFERENCE MUST TEACH EVERY ELEMENT OF THE CLAIM**

"A claim is anticipated only if **each and every element** as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). >"When a claim covers several structures or compositions, either generically or as alternatives, the claim is deemed anticipated if any of the structures or compositions within the scope of the claim is known in the prior art." *Brown v. 3M*, 265 F.3d 1349, 1351, 60 USPQ2d 1375, 1376 (Fed. Cir. 2001) (claim to a system for setting a computer clock to an offset time to address the Year 2000 (Y2K) problem, applicable to records with year date data in

"at least one of two-digit, three-digit, or four-digit" representations, was held anticipated by a system that offsets year dates in only two-digit formats). See also MPEP § 2131.02.< "The **identical invention must be shown in as complete detail as is contained in the ... claim.**" *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must be arranged as required by the claim, but this is not an *ipsissimis verbis* test, i.e., identity of terminology is not required. *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990).

The cited Stevenson et al. reference does not anticipate the polyelectrolyte film defined by claim 1 since the reference does not disclose the identical invention shown in as complete detail as required by the claim. That is, the Stevenson et al. reference does not disclose a polyelectrolyte film in which both the positively charged and the negatively charged polymer comprise repeat units with at least two fluorine atoms. In view thereof, applicants respectfully request that the rejection be withdrawn.

To anticipate the polyelectrolyte complex of claim 1, Stevenson et al. must describe a polyelectrolyte film embodiment having all of the features of claim 1. Stevenson et al. do not do so. In this regard, they describe a polyelectrolyte film deposited on a substrate comprising a positively charged polyelectrolyte and a negatively charged polyelectrolyte. The negatively charged polyelectrolyte is described starting at paragraph [0021], which discloses the structure of a polyacrylic acid-fluorocarbon modified polyacrylic acid co-polymer in which 0.1 to 90 mole percent of the acrylic acid repeat units are modified with alkyl groups  $R_3$  and  $R_4$ . The  $R_3$  group is at least one ethylene oxide repeat unit, while the  $R_4$  group is a fluorinated hydrocarbyl comprising at least one carbon atom

comprising multiple fluorine atoms. See paragraphs [0022] to [0028] of Stevenson et al. The fluorinated repeat units are uncharged while the non-fluorinated repeat units are negatively charged. While Stevenson et al. disclosed polyelectrolyte complexes in which this fluorocarbon modified polyacrylic acid co-polymer was employed as a negatively charged polyelectrolyte in preparing polyelectrolyte complexes, Stevenson et al. did not describe any polyelectrolyte complexes in which both the positively charged polymer and the negatively charged polymer comprise repeat units with at least two fluorine atoms.

Stevenson et al.'s only disclosure regarding positively charged polymers is paragraphs [0029]-[0031]. Paragraphs [0029]-[0030] show the structure of poly(allylamine hydrochloride). In paragraph [0031], Stevenson et al. state "Alternatively, the polycation may be a fluorinated polycation." Stevenson et al. do not show the structure of this fluorinated polycation, nor do they show anywhere in their specification that this polycation alternative comprises at least two fluorine atoms. Moreover, Stevenson et al. do not use a fluorinated polycation in any polyelectrolyte complex disclosed therein. Finally, Stevenson et al. do not disclose any polyelectrolyte complex comprising a polycation comprising repeat units having at least two fluorine atoms.

Since Stevenson et al. do not describe any polyelectrolyte complexes in as complete detail as required by the claim, Stevenson et al. do not anticipate claim 1. In view thereof, applicants respectfully request that the rejection be withdrawn.

Although obviousness is not a current basis for rejecting claim 1 over Stevenson et al., claim 1 is not obvious over Stevenson et al. since Stevenson et al. would not have provided the ordinarily skilled person with any reason for preparing a

polyelectrolyte complex having all of the features defined in claim 1. For example, Stevenson et al. simply do not suggest employing a polyanion and a polycation both of which comprise repeat units that have a fluorine atom, much less a polycation comprising repeat units with at least two fluorine atoms.

Moreover, Stevenson et al. do not provide any reason why the ordinarily skilled person would have modified PAH with fluorine atoms in a manner that ensures that the polycation comprises at least two fluorine atoms or selected such a material. Such a material is not easily attainable. For example, well-known suppliers of chemicals, such as Sigma Aldrich and Fisher Scientific, do not sell allylamine compounds comprising a fluorine atom, much less polymers in which the allylamine repeat units comprise at least two fluorine atoms.

See

[http://www.sigmaaldrich.com/catalog/Lookup.do?N5=Keyword%20\(full text\)&N3=mode+matchpartialmax&N4=allylamine&D7=0&D10=allylamine&N25=0&N1=S\\_ID&ST=RS&F=PR](http://www.sigmaaldrich.com/catalog/Lookup.do?N5=Keyword%20(full text)&N3=mode+matchpartialmax&N4=allylamine&D7=0&D10=allylamine&N25=0&N1=S_ID&ST=RS&F=PR) and

[http://www.fishersci.com/wps/portal/SEARCHRESULTS?ru=http%3A%2F%2Fprodwcserver%3A9060%2Fwebapp%2Fwcs%2Fstores%2Fservlet%2FSearch&searchPref=no&position=search&preferProd=unchecked&searchType=Rapid&catalogCode=RE\\_SC&keyWord=allylamine&catCode=ALL](http://www.fishersci.com/wps/portal/SEARCHRESULTS?ru=http%3A%2F%2Fprodwcserver%3A9060%2Fwebapp%2Fwcs%2Fstores%2Fservlet%2FSearch&searchPref=no&position=search&preferProd=unchecked&searchType=Rapid&catalogCode=RE_SC&keyWord=allylamine&catCode=ALL). Since the material is not widely available and since Stevenson et al. did not provide any reason to use a PAH polymer in which the repeat units have at least two fluorine atoms, applicants respectfully submit that the polyelectrolyte complex defined by claim 1 is not only novel over Stevenson et al. but non-obvious as well.

Claims 2-5 depend from claim 1 and are therefore patentable for the same reasons as claim 1 and by virtue of the additional requirements therein.



For example, claim 5 is patentable over Stevenson et al. since Stevenson et al. do not disclose any polymer having any repeat unit defined therein. The closest repeat unit described in Stevenson et al. to one that is described in claim 5 is the "...fluorinated esters having the formulae  $-\text{COOC}_1$  wherein  $\text{C}_1$  is  $-(\text{CH}_2)_p(\text{CF}_2)_q\text{F}$ ;  $-(\text{CH}_2)_p(\text{CF}_2)_q\text{COOH}$ ;  $-(\text{CH}_2)_p(\text{CF}_2)_q\text{OPO}_3^-$ ;  $-(\text{CH}_2)_p(\text{CF}_2)_q\text{SO}_3^-$ ; or  $-(\text{CH}_2)_p(\text{CF}_2)_q\text{OSO}_3^-$ ;..." In each and every fluorinated ester repeat unit defined by claim 5, the linking group between the vinyl group and the fluorinated hydrocarbon is an alkyl group. Stevenson et al.'s linking group  $\text{R}_3$  in the structure shown in paragraph [0021] is " $(-\text{CH}_2\text{CH}_2\text{O})_x$ ." That is, Stevenson et al. link the fluorinated hydrocarbon portion through an ethylene oxide group. Since this linking group is not the same as any linking group defined in claim 5, Stevenson et al. do not disclose any of the repeat units defined in claim 5, and the rejection should be withdrawn.

#### **VIII. Claim Rejections Under 35 U.S.C. §102(b)**

Reconsideration is requested of the rejection of claims 1-3, 5, and 8 as being anticipated by DeLongchamp et al., Chem. Mater., 2003, 15, 1165-1173.

DeLongchamp et al., like Stevenson et al., do not anticipate the polyelectrolyte film defined by claim 1 for substantially the same reasons. DeLongchamp et al. describe, starting at page 1171, first column, measuring the ionic conductivity of a film comprising linear polyethylenimine and Nafion. Linear polyethyleneimine is non-fluorinated, while Nafion is a negatively charged polymer with repeat units comprising at least two fluorine atoms. DeLongchamp et al., however, did not disclose any other positively charged polymer other than non-fluorinated polyethyleneimine in their

experiments. DeLongchamp et al. chose LPEI specifically because LPEI possesses high donicity. See page 1166, second column, first full paragraph.

DeLongchamp et al. do not describe any polyelectrolyte complexes in as complete detail as required by the claim, in that they do not describe any polyelectrolyte complex comprising a net positively charged polyelectrolyte polymer comprising repeat units with at least two fluorine atoms. In view thereof, DeLongchamp et al. do not anticipate claim 1, and applicants respectfully request that the rejection be withdrawn.

It is important to note that neither reference -- neither DeLongchamp et al. nor Stevenson et al. -- disclose a positively charged polyelectrolyte polymer comprising repeat units having at least two fluorine atoms. Based on the prior art of record, a positively charged polyelectrolyte polymer comprising repeat units having at least two fluorine atoms was simply unknown prior to applicant's discovery and disclosure.

Although obviousness is not a current basis for rejecting claim 1 over DeLongchamp et al., claim 1 is not obvious over DeLongchamp et al. since DeLongchamp et al. would not have provided the ordinarily skilled person with any basis for preparing a polyelectrolyte complex having all of the features defined in claim 1. For example, DeLongchamp et al. would not have provided the ordinarily skilled person with any reason for conducting experiments with any other positively charged polymer other than polyethyleneimine, which was the only disclosed positively charged polyelectrolyte. LPEI was specifically chosen for high donicity. DeLongchamp et al. do not disclose the donicity of any other positively charged polyelectrolyte polymer, much less such a polymer comprising repeat units having at least two fluorine atoms. In view therefore, DeLongchamp et

al. would not have provided the ordinarily skilled person with any reason for making such a substitution.

Moreover, DeLongchamp et al.'s disclosure would have not caused the ordinarily skilled person to further experiment with the polyelectrolyte complex comprising polyethyleneimine and Nafion, and in fact provided the ordinarily skilled person with plenty of reason to avoid preparing polyelectrolyte complexes comprising Nafion. On page 1171, first column, they state "The combination of Nafion with LPEI via the LBL method resulted **in polymer electrolyte films with ionic conductivity lower than that of commercial Nafion membranes,...**" On page 1173, after Conclusions, they state "**The LPEI/Nafion system has limited ion conductivity**, as the LBL process cross-links sulfonic acid sites, preventing rearrangement to the nanoporous morphology required for fast ion conduction in Nafion." Given the deficiencies of the polyelectrolyte complex comprising Nafion, the ordinarily skilled person would not have found any reason to further experiment with the complex since the other complexes prepared by DeLongchamp et al. performed better. Moreover, the ordinarily skilled person would not have found any reason to prepare other polyelectrolyte complexes comprising Nafion at all since Nafion membranes that are **not** formed into polyelectrolyte complexes exhibited better ion conduction than polyelectrolyte complexes comprising Nafion. That is, DeLongchamp et al. provide ample reason not to form Nafion into a polyelectrolyte complex, much less into a complex comprising a positively charged polyelectrolyte comprising repeat units having at least two fluorine atoms.

In view of the foregoing, applicants respectfully submit that the polyelectrolyte complex defined by claim 1 is not only novel over DeLongchampe et al. but non-obvious as well.

Claims 2, 3, 5, and 8 depend from claim 1 and are therefore patentable for the same reasons as claim 1 and by virtue of the additional requirements therein.

## **IX. Claim Rejections Under 35 U.S.C. §103(a)**

### **A. Claims 36-38**

Reconsideration is requested of the rejection of claims 36-38 as being obvious over DeLongchamp et al., Chem. Mater., 2003, 15, 1165-1173.

Claims 36-38 depend from claim 1 and are therefore patentable for the same reasons as claim 1 and by virtue of the additional requirements therein.

Claims 36-38 are additionally patentable over DeLongchamp et al. since they define structures that are based on the transmission of electrons or light through the polyelectrolyte film. These claims are non-obvious over DeLongchamp et al. since DeLongchamp et al. show empirical evidence that polyelectrolyte complexes comprising a fluorinated negatively charged polyelectrolyte polymer are actually poor electric conductors. On page 1171, first column, they state "The combination of Nafion with LPEI via the LBL method resulted in polymer electrolyte films **with ionic conductivity lower than that of commercial Nafion membranes,...**" Table I shows that the ionic conductivity of the LPEI/NAFION film was the lowest of all films tested at 52% and 100% relative humidity. On page 1173, after Conclusions, they state "**The LPEI/Nafion system has limited ion conductivity,** as the LBL process cross-links sulfonic acid sites, preventing rearrangement to the nanoporous morphology required for fast ion conduction in Nafion." If anything, DeLongchamp et al.'s empirical data suggests that the polyelectrolyte complex comprising Nafion is the worst choice

for use in an application or structure that requires electrical conductivity. In contrast, applicant discovered and disclosed a polyelectrolyte complex that was successful in this context in the face of prior art that suggested otherwise. See MPEP §2145 Part X.D.3.

#### **B. Claims 9-11**

Reconsideration is requested of the rejection of claims 9-11 as being obvious over DeLongchamp et al., Chem. Mater., 2003, 15, 1165-1173 in view of Tomita et al. (U.S. 5,312,710).

Claims 9-11 depend from claim 1 and are therefore patentable for the same reasons as claim 1 and by virtue of the additional requirements therein.

For example, claims 9-11 are directed to the polyelectrolyte film of claim 1 and additionally require the film to comprise particles. DeLongchamp et al. do not incorporate particles into their films, nor do they provide any reason to do so. Tomita et al. disclose toner particles that are covered with a polyfluorinated, uncharged polymer. The fluorinated polymers are described at Col. 5, lines 26-59. None of these fluorinated polymers are charged. Moreover, the ordinarily skilled person would not have perceived any reason to employ charged fluorinated polymers in this context.

The Office asserts that it would have been obvious to combine the toner particles of Tomita et al. with the polyelectrolyte film of DeLongchamp et al. since that would improve the chargeability of the composition.

This reason does not provide any support for the combination, and in fact, the Office has made the combination using hindsight merely to meet the requirements of the claims. The only aspect that Tomita et al. and DeLongchamp et al. have

in common is the use of a fluorinated polymer. There are no other similarities that would have caused the ordinarily skilled person to combine these two references for the Office's reason or for any other reason. The DeLongchamp et al. reference is specifically directed to testing several polyelectrolyte complex films for ionic conductivity. They found that the polyelectrolyte complex film comprising Nafion was, in fact, the poorest performer, which would have caused the ordinarily skilled person to prefer to use uncomplexed Nafion membranes, which are commercially available, rather than experiment with complexed Nafion membranes.

The Tomita et al. reference is directed to toner particles, which must be electrostatically or electrokinetically charged so that they can be imprinted onto a substrate to form an image. A critical feature of toner particles is the prevention of their agglomeration, which enhances the resolution of the imprinted image. That is, toner particles achieve resolution only when they are relatively discrete particles.

The ordinarily skilled person would not have perceived any advantage that could be obtained by combining DeLongchamp et al. and Tomita et al. In DeLongchamp et al.'s experiments, they tested the films for ionic conductivity, in particular for their ability to conduct protons, called "donicity" therein. Alternatively, conductivity may be measured by electron conductivity. Both protons and electrons are extremely small particles (on the order of picometers), and DeLongchamp et al. observed that the LPEI/Nafion films were poor at conducting these small particles. Tomita et al.'s particles range in size from 0.5 micrometers to 2 micrometers. See Col. 7, lines 15-16. The ordinarily skilled person would have concluded since the DeLongchamp et al.'s LPEI/Nafion film was a poor proton and

electron conductor that it would have been wholly incapable of conducting charge using toner particles several orders of magnitude larger. Additionally, neither reference discloses any other advantage of incorporating Tomita et al.'s toner particles into DeLongchamp et al.'s film for this or any other reason.

Moreover, the ordinarily skilled person would not have concluded that incorporating Tomita et al.'s toner particles into DeLongchamp et al.'s films as a toner material since the toner particles, to be effective, must be maintained as relatively discrete particles in order to enhance the resolution of the image obtained from their use.

Simply stated, the respective references are directed to entirely different materials that are useful for different purposes and that are prepared using entirely different processes. The materials share one and only one common feature -- fluorinated polymers. Other than that feature, the ordinarily skilled person would not have perceived any similarities that would have given the skilled person any particular reason to combine these references. Therefore, the combination is the result of hindsight gleaned only from applicant's claims and is improper. Applicants request that the rejection be withdrawn.

### **C. Claims 6 and 7**

Reconsideration is requested of the rejection of claims 6 and 7 as being obvious over Schlenoff (WO 03/014234) in view of Stevenson et al. (U.S. 2004/0191504) and Speaker (U.S. 4,554,076).

Claims 6 and 7 depend from claim 1 and are therefore patentable for the same reasons as claim 1 and by virtue of the additional requirements therein.

Claims 6 and 7 are directed to particular repeat units for use in the positively charged polyelectrolyte polymer. The Schlenoff et al. reference is cited for disclosing polyelectrolyte complexes for corrosion control. Polyelectrolytes include poly(N-alkylvinylpyridines) such as poly(N-octyl-4-vinyl pyridinium) and poly(diallyldimethylammonium). Neither of these are fluorinated.

Stevenson et al. is cited for disclosing polyelectrolyte complexes comprising a negatively charged polyelectrolyte comprising fluorine atoms. In [0029] and [0031], Stevenson et al. state that poly(allylamine hydrochloride) polycation can be a fluorinated polycation, but they did not disclose the structure of such a polycation, nor that such a polycation's repeat units comprise at least two fluorine atoms. There is thus no basis for the Office's assertion that this is the same material as that described in applicant's specification.

Speaker discloses the use of fluorinated long chain pyridinium amphiphilic compounds for use in modifying membrane surfaces. The Office asserts that Speaker's materials include a positively charged polymer. In fact, Speaker discloses the opposite. In Col. 2, lines 51-64, Speaker discloses that "Molecular weight...is of great significance in that it governs, to a large extent, the surface-active character of the compounds to be used." Speaker then says the MW should be between 350 and 700 for fluorinated compounds. Polymers are macromolecular compounds comprising multiple repeat units and thus have much higher molecular weights. Therefore, Speaker is dealing specifically with non-polymeric materials such that the ordinarily skilled person would not have found any reason to



combine Speaker with Schlenoff et al. and Stevenson et al., both of which are directed to polymeric materials.

Moreover, Speaker employs the materials in the context of forming Langmuir-Blodgett layers. Langmuir-Blodgett layers are formed into monolayers. This differs substantially from the polyelectrolyte complexes defined by claims 6 and 7 since they necessarily comprise one or more bilayers comprising both a positively charged polyelectrolyte and a negatively charged polyelectrolyte. See Stevenson et al.'s abstract and claim 1. Schlenoff et al. is also directed to polyelectrolyte complexes comprising at least a bilayer comprising both a positively charged polyelectrolyte and a negatively charged polyelectrolyte. For this additional reason, the ordinarily skilled person would not have found any reason to combine Speaker with Schlenoff et al. or Stevenson et al.

Since there is no reason to combine the three references, much less any reason to combine the references in a manner that meets all of the limitations of claims 6 and 7, applicant respectfully submits that the combination does not render these claims obvious and the rejection should be withdrawn.

#### **D. Claims 28 and 29**

Reconsideration is requested of the rejection of claims 28 and 29 as being obvious over Stevenson et al. (U.S. 2004/0191504).

Claims 28 and 29 depend from claim 1 and are therefore patentable for the same reasons as claim 1 and by virtue of the additional requirements therein.

#### **E. Claims 30 and 31**

Reconsideration is requested of the rejection of claims 30 and 31 as being obvious over Stevenson et al. (U.S. 2004/0191504) in view of Stirniman et al. (U.S. 6,355,300).

Claims 30 and 31 depend from claim 1 and are therefore patentable for the same reasons as claim 1 and by virtue of the additional requirements therein.

Stirniman et al. do not correct the deficiencies of the Stevenson et al. disclosure and thus would not have made it obvious to apply the polyelectrolyte film of claim 1 to a rotating disc magnetic storage medium ("fixed disc"), as required by claims 30 and 31. Stirniman et al. disclose at col. 3, lines 42-63, various lubricants for magnetic recording media, including perfluoropolyethers, functionalized perfluoropolyethers, perfluoropolyalkylethers, and functionalized perfluoropolyalkylethers. Since Stirniman et al.'s mechanism for depositing the lubricants was by vapor deposition, they observed at col. 3, line 64 to col. 4, line 15, that it was advantageous to use lower molecular weight fluorinated polymers as lubricants. Stirniman et al.'s polymers are neutrally charged polymers, unlike the polyelectrolyte polymers used to form the polyelectrolyte films of claims 30 and 31.

Neither Stevenson et al. nor Stirniman et al. disclose any polyelectrolyte film comprising an interpenetrating network of a net positively charged polyelectrolyte polymer comprising repeat units with at least two fluorine atoms and a net negatively charged polyelectrolyte polymer comprising repeat units with at least two fluorine atoms, nor would either reference have provided any reason to prepare such a film. The polyelectrolyte film is non-obvious over Stevenson et al. for reasons already stated herein.

Stirniman et al.'s disclosure would not have made the polyelectrolyte film any more obvious to the ordinarily skilled person and in fact would have led the skilled person away from using such a film in their method for protecting magnetic surfaces. Stirniman et al.'s deposition method requires the vaporization of the lubricant material. Low molecular weight, neutrally charged fluorinated polymers are appropriate for such a deposition method since such polymers may be vaporized. Highly charged polyelectrolyte materials are not easily vaporized. In fact, it is known that ionic materials tend to have high melting and boiling points. Sodium chloride, for example, has a melting point of 801°C and a boiling point of 1465°C. The polyelectrolyte polymers of the film of claim 1 similarly have high boiling points and are thus not easily vaporized. In view thereof, the ordinarily skilled person would not have found any reason to employ fluorinated polyelectrolyte polymers in the context of Stirniman et al.'s method.

In view of the foregoing, applicants respectfully submit that the films defined by claims 30 and 31 are non-obvious in view of the combination of Stevenson et al. and Stirniman et al. and respectfully request the rejection be withdrawn.

**F. Claims 28-31**

Reconsideration is requested of the rejection of claims 28-31 as being obvious over DeLongchamp et al., Chem. Mater., 2003, 15, 1165-1173 in view of Chiba et al. (U.S. 6,670,309).

The disclosure of Chiba et al. is in some ways similar to that of Stirniman et al. in that they disclose a method of applying a neutrally charged fluorinated polymer to a surface of a magnetic disk. In Chiba et al.'s method, the neutrally charged fluorinated polymer is a fluororesin, such as the

Fomblin compounds, which are known fluorinated polyethers that are terminated with end groups, usually alcohols or aromatic rings.

In Chiba et al.'s disclosure, rather than vaporize the lubricant fluoropolymer, they dissolve the fluoropolymer in a fluorinated solvent. Chiba et al. provide a method of purifying the fluorinated solvent in order to remove ionic organic materials from the solvent, which are stated to be pollutants. See Col. 1, lines 45-50: "...trace amounts of pollutants (ionic organic materials in many cases)..."

The disclosure of Chiba et al. particularly would have led the ordinarily skilled person away from the Office's proposed combination of applying a polyelectrolyte complex, such as in DeLongchamp et al. to the surface of a magnetic disk. The overarching principle of the Chiba et al. method is to **remove** ionic components from the solvent-fluororesin mixture since these ionic components are considered to be **pollutants**. DeLongchamp et al.'s polyelectrolyte polymers are ionic, which are precisely the sort of materials that Chiba et al. seek to exclude. Given that Chiba et al. would have caused the ordinarily skilled person to conclude that ionic materials are pollutants, the Office must articulate some reason, found in the prior art, why the ordinarily skilled person would substituted Chiba et al.'s neutrally charged materials with ionic materials. No such reason can be provided in either DeLongchamp et al. or Chiba et al. since neither reference would have provided the ordinarily skilled person with any basis for concluding that polyelectrolyte complexes are useful for lubricating Chiba et al.'s magnetic disks.

In view thereof, applicants respectfully submit that the Office's combination actually teaches away from the proposed

modification, and *prima facie* obviousness is not met herein. Applicants respectfully request, therefore, that the rejection be withdrawn.

#### **G. Claims 32-33**

Reconsideration is requested of the rejection of claims 32-33 as being obvious over DeLongchamp et al., Chem. Mater., 2003, 15, 1165-1173 in view of Moriga et al. (U.S. 4,497,720).

Claims 32 and 33 depend from claim 1 and are therefore patentable for the same reasons as claim 1 and by virtue of the additional requirements therein.

Moriga et al. disclose a composition to be applied to metallic surfaces that are consistently exposed to temperatures in excess of 200°C. As stated therein, lubricant materials that are added to such metals are known to form sludge after extended exposure to high heat. Moriga et al.'s composition which resists forming a sludge comprises 50 wt.% or more polyalkylene glycol and 50 wt.% or less fluorine-containing compounds. See Col. 3, lines 8-39. These compounds can be anionic, non-ionic, or cationic and contain fluoroalkyl groups, such a polyalkylene oxide modified with a fluoralkyl group.

Moriga et al.'s composition is substantially different from the polyelectrolyte complex disclosed in DeLongchamp et al. Moriga et al.'s composition predominantly comprises a polyalkylene glycol, for example, polyethylene glycol or polypropylene glycol. The predominant polyalkylene glycol component is non-ionic, neutrally charged, and hydrophilic, in contrast to the polyelectrolyte materials used to prepare DeLongchamp et al.'s complexes, which are highly ionic, highly charged, and, in the case of fluorinated polyelectrolytes like Nafion, relatively hydrophobic. The materials, in short, have

nothing in common beyond being polymers. The fluorine containing material in Moriga et al.'s composition is similar to the polyalkylene glycol component except for the substitution of hydrogen with fluorine atoms. These materials are also non-ionic and neutrally charged.

The charged materials that Moriga et al. propose using are described starting at col. 6, line 29 and are not polyelectrolytes because they contain a single charged unit, such as a single carboxylate, a single phosphate, or a single sulfate that terminates the molecule, hence Moriga et al.'s use of the term residue. Moriga et al. do not describe these materials in a manner that the ordinarily skilled person would consider them to be polyelectrolytes.

In short, Moriga et al. and DeLongchamp et al. are describing materials that share almost no common features. The only feature that is common is that the materials are polymers. But, it is known that polymers can vary widely in physical and chemical characteristics. In view thereof, taking Moriga et al. at their word that their materials are useful for applying to metals for use in high temperature applications, the ordinarily skilled person would have had absolutely no basis whatsoever for concluding that DeLongchamp et al.'s polyelectrolyte complexes are useful at high temperatures. There is nothing in either reference that would have caused the ordinarily skilled person to conclude otherwise. If anything, the ordinarily skilled person may have concluded that fluorinated polymers are not particularly useful at high temperatures, given that Teflon is known to deteriorate at high temperatures. See Moriga et al. at Col. 2, lines 45-49.

Since Moriga et al. provided a unique material comprising polyalkylene glycols/fluorinated polyalkylene glycols for high

temperature use and since neither reference would have provided the ordinarily skilled person with any basis for concluding that complexes formed from polyelectrolytes share that same high temperature stability, applicants submit that the ordinarily skilled person would not have found any reason to formed the polyelectrolyte film of claim 1 between two contacting, moving metal surfaces as required by claims 32 and 33. Accordingly, applicants respectfully request that the rejection be withdrawn.

#### **H. Claims 12 and 13**

Reconsideration is requested of the rejection of claims 12 and 13 as being obvious over Itami (U.S. 2003/0134209).

Claim 12 is directed to a film comprising a charged polyelectrolyte polymer comprising repeat units with at least two fluorine atoms and a fluorinated charged particle comprising repeat units with at least two fluorine atoms, wherein the charge of the polyelectrolyte polymer is opposite that of the charge of the fluorinated charged particle.

The film defined by claim 12 is non-obvious over Itami since Itami fails to disclose any film having all of the properties of the film defined by claim 12. Moreover, Itami would not have provided the ordinarily skilled person with any reason to extensively modify the material described by Itami in order to prepare a film having all of the requirements of claim 12.

In the context of determining obviousness, the Supreme Court in *KSR International Co. v. Teleflex Inc. (KSR)*, 550 U.S. \_\_\_, 82 USPQ2d 1385 (2007), reaffirmed the familiar framework for determining obviousness as set forth in *v. John Deere Co.* (383 U.S. 1, 148 USPQ 459 (1966)). As stated in MPEP §2141 Part II, two of the considerations within that framework include:

- (A) Determining the scope and contents of the prior art;
- (B) Ascertaining the differences between the prior art and the claims in issue.

Once differences between the prior art and the claims have been ascertained, KSR and MPEP §2142 endorse the determination of obviousness based on whether there are some reasons why the ordinarily skilled person would have modified the prior art in order to bridge the gap caused by the differences between the prior art and the claimed invention:

The key to supporting any rejection under 35 U.S.C. 103 is **the clear articulation of the reason(s) why the claimed invention would have been obvious.** The Supreme Court in *KSR International Co. v. Teleflex Inc.*, 550 U.S. \_\_\_, \_\_\_, 82 USPQ2d 1385, 1396 (2007) noted that the analysis supporting a rejection under 35 U.S.C. 103 should be made explicit. The Federal Circuit has stated that "rejections on obviousness cannot be sustained with mere conclusory statements; **instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.**" *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006). See also *KSR*, 550 U.S. at \_\_\_, 82 USPQ2d at 1396 (quoting Federal Circuit statement with approval).

In this regard, there are several differences between the resinous layer described by Itami and the film defined by claim 12. In view thereof, *prima facie* obviousness requires the clear articulation of a reason why the ordinarily skilled person would have modified Itami's material to reach the film defined by claim 1. No such reasons are provided in Itami. Accordingly, *prima facie* obviousness cannot be established based on Itami's disclosure.

Itami discloses an electrophotographic photoreceptor. The photoreceptor is a resinous layer. At paragraph [0037], Itami states that the resinous layer contains a siloxane condensation



product component and fluorine atom-containing particles. Or, the resinous layer contains an organic polymer component and a siloxane condensation product component, either of which component comprises a fluorine-atom containing resin as well as fluorine atom-containing particles. The resin is formed on an electrically conductive support.

Monomers for use in constructing the organic polymer component are described in paragraphs [0044] and [0045]. The monomers include acrylates and methacrylates that are modified with perfluoroalkyl groups. Modification of the acrylates or methacrylates with perfluoroalkyl groups yields esters, which are neutrally charged.

The neutrally charged vinyl monomers described in paragraphs [0044]-[0045] materials are reacted with the neutrally charged silane monomers described in paragraph [0047]. These materials have no net charged, either as monomers or when incorporated into a polymer.

Itami further discloses additional vinyl monomers for incorporating into the resinous layer including "...for example, (metha)acrylic acid esters..." See paragraph [0050]. These materials are additionally neutrally charged.

Paragraph [0068] discloses the fluorine atom-containing particles, such as PTFE and polyvinylidene fluoride, both of which do not contain any charge unless modified. Itami does not disclose any modifications that would impart a charge to these particles.

In contrast to the film defined by claim 12 which requires a charged polyelectrolyte polymer, a charged fluorinated particle, wherein the polymer and the particle are oppositely charged, Itami discloses a neutrally charged polymer, a neutrally charged particle, and a polymer and particle having

the same charge. In order for the film of claim 12 to be *prima facie* obvious in view of the disclosure of Itami, the ordinarily skilled person would have had to find a reason to (1) alter the net charge of Itami's polymer, (2) alter the net charge of the particle, and (3) ensure that the alterations of (1) and (2) are such that the polymer and particle are of opposite charge. Applicant respectfully submits that the Itami reference would not have provided the ordinarily skilled person any reason to modify Itami's resinous material so dramatically, particularly since such modifications may or may not be consistent with Itami's requirements that the resinous layer be useful as an electrophotographic photoreceptor.

Given the substantial differences between the film defined by claim 12 and the lack of any reasons in Itami to modify the resinous layer disclosed therein to meet the requirements of claim 12, applicant respectfully submits that claim 12 is non-obvious in view of Itami. Applicant therefore requests that the rejection be withdrawn.

Claim 13 depends from claim 12 and is patentable for the same reasons as claim 12 and by virtue of the additional requirements therein.

#### **I. Claims 12 and 13**

Reconsideration is requested of the rejection of claims 12 and 13 as being obvious over Lazarz et al. (U.S. 4,289,600) in view of Yonkoski et al. (U.S. 5,380,644).

The framework for determining obviousness with respect to the rejection over Lazarz et al. and Yonkoski et al. is the same as that described in Part VIII.H. of this amendment. First, the differences between the prior art and the claims must be ascertained. Then, in view of these differences, there must be

some rational reason found in the art why the ordinarily skilled person would have modified the references in order to meet the requirements of claim 12.

Lazarz et al. describe, from Col. 5, line 29 to Col. 6, line 28, the components of a microporous separator. The separator is prepared by mixing dry fluorocarbon polymer particles, such as PTFE polymer, with a fluorosurfactant lubricant. All of the fluorocarbon polymer particles disclosed in Col. 5, lines 29-44 are neutrally charged.

Yonkoski et al. is cited for disclosing fluorinated polymers useful as lubricants.

Lazarz et al. state that the fluorosurfactant lubricant may be Zonyl FSN, which comprises perfluorinated alkyl chains bonded to a polyethylene oxide chain. These fluorosurfactants are not charged. While Lazarz et al. state in Col. 7, lines 9-21 that cationic and anionic fluorosurfactants may be used, they are not as good as the nonionic fluorosurfactants. In fact, as shown in Examples 8-13, starting at Col. 12, line 25, Lazarz et al. disclose the very poor results achieved when using cationic and anionic fluorosurfactants. See, in particular, Table 4, which states that the resulting materials are "Extremely poor," "adheres severely to rotors," "obnoxious fishy smell," "tears readily into strips that won't adhere to one another easily," and "crumbly." These disclosures do not provide only a modest teaching away from using charged lubricants. These results would have actively discouraged the ordinarily skilled person from preparing any materials comprising charged lubricants -- whether they are polymeric or not. It appears from Lazarz et al. that any use of charged materials would only meet with failure, e.g., an obnoxious fishy smell.

Since Lazarz et al. provided empirical results that would have actively discouraged the ordinarily skilled person from combining fluoropolymer particles, charged or not, with charged fluorinated lubricants, whether polymeric or not, the ordinarily skilled person simply would not have engaged in the modifications necessary to prepare a film meeting all of the limitations of claim 12. Simply stated, Lazarz et al.'s empirical results show the failure that will be met by going down that path. That is, the ordinarily skilled person would have interpreted Lazarz et al.'s results as presenting no reasonable expectation of success. In view thereof, applicant's success represents an inventive insight that is deserving of patent protection. Applicant therefore respectfully requests that the rejection over Lazarz et al. in view of Yonkoski et al. be withdrawn.

Claim 13 depends from claim 12 and is patentable for the same reasons as claim 12 and by virtue of the additional requirements therein.

**CONCLUSION**

In view of the foregoing, applicants respectfully request reconsideration and allowance of the pending claims.

Applicant does not believe that a fee is required for the filing of this response, as it is being submitted within the three-month shortened statutory period for reply. Should applicant be incorrect, the Commissioner is hereby authorized to charge the necessary fee to Deposit Account No. 19-1345.

Respectfully submitted,

/paul fleischut/

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